

AN EQUIPMENT NOISE EVALUATION TEST PLAN IS REQUIRED. THIS PLAN SHALL BE SUBMITTED TO, AND APPROVED BY, THE BUYER AT LEAST SIX (6) WEEKS PRIOR TO TESTING.

THIS EVALUATION PLAN SHALL DETAIL THE TEST PROCEDURES TO BE USED FOR AIRBORNE, STRUCTUREBORNE, TRANSIENT STRUCTUREBORNE AND LIQUIDBORNE NOISE TESTING. THE EQUIPMENT NOISE EVALUATION TEST PLAN SHALL CONTAIN THE FOLLOWING INFORMATION:

TEST AND EQUIPMENT INFORMATION.

- A. EQUIPMENT TO BE EVALUATED, INCLUDING PURCHASE ORDER NUMBER.
- B. EVALUATION MEASUREMENTS TO BE PERFORMED.
- C. EVALUATING ACTIVITY AND TEST SITE.
- D. EQUIPMENT SPECIFICATION ACCEPTANCE CRITERIA.
- E. PUMP TYPE (SCREW, CENTRIFUGAL, ETC.).
- F. PUMP INTERNAL DESIGN PARAMETERS (NUMBER OF DRIVE SCREWS, IDLER SCREWS, THREADS PER SCREW, IMPELLER VANES, DIFFUSER VANES, GUIDE VANES, ETC.).
- G. DRIVEN AND DRIVER UNIT MANUFACTURERS.
- H. DRIVER UNIT HORSEPOWER (HP).
- I. RATED ELECTRICAL CHARACTERISTICS, INCLUDING VOLTS, AMPS, PHASE.
- J. RATED FLUID MEDIA PARAMETERS (FLOW RATES, TEMPERATURES, PRESSURES, SPECIFIC GRAVITY, SALINITY, ENTRAINED GASES OR SOLIDS ETC.).
- K. EQUIPMENT RATED OPERATIONAL PARAMETERS (DRIVER AND DRIVEN UNIT REVOLUTION PER MINUTE (RPM), FLOW RATE, DEVELOPED HEAD, NPSH, EFFICIENCY, BHP, ETC.).
- L. EXPECTED EQUIPMENT NOISE AND VIBRATION SOURCES AND THEIR FREQUENCIES OF EXCITATION

(ROTATIONALS, GEAR TOOTH CONTACT, BLADE RATE, PULSATION, VANE, DIFFUSER, FOR EACH SPEED. LIST OTHER SIGNIFICANT FORCING FREQUENCIES FOR PUMP-MOTOR UNITS INCLUDING, BUT NOT LIMITED TO, THOSE PRODUCED BY BEARINGS, MOTOR ELECTRO-MECHANICS, ELECTRICAL HARMONICS AND ROTOR CRITICAL FREQUENCIES).

- M. WHETHER THE BEDPLATE OR SUBBASE IS THE SAME AS THE ONE USED FOR SHIPBOARD INSTALLATION.
- N. CALCULATIONS OR TEST DATA SHOWING THE FOUNDATION OR MOUNTING FIXTURE FOR RESILIENT MOUNTS HAS A NATURAL FREQUENCY GREATER THAN 25 HZ AND THAT FIXED BASE NATURAL FREQUENCIES ARE NOT WITHIN 0.414 TIMES FUNDAMENTAL ROTATIONAL OR OTHER PRIMARY FORCING FREQUENCIES (SEE MIL-STD-740-2, 5.6.1.1).
- O. RESILIENT MOUNT MANUFACTURER AND MODEL NUMBER.
- P. DATES OF MANUFACTURE OF RESILIENT MOUNTS TO BE USED.
- Q. NUMBER OF RESILIENT MOUNTS TO BE USED AND LOAD RATINGS (POUNDS).
- R. IF THE USE OF NON-NAVY STANDARD RESILIENT MOUNTS HAS BEEN APPROVED, PROVIDE THE CHARACTERISTICS INCLUDING LOAD RATING IN POUNDS AND RESONANT FREQUENCY DATA, OF THE MOUNTS TO BE USED.
- S. PLANNED EQUIPMENT LOAD DURING TEST (FULL, HALF, ETC.).
- T. PLANNED OPERATING SPEEDS DURING TEST (RPM).
- U. PLANNED THROTTLING CONDITIONS, IF ANY.
- V. PLANNED OPERATING SUCTION AND DISCHARGE FLUID MEDIA PARAMETERS DURING TEST (FLOW RATES, PRESSURES AND TEMPERATURES, LIQUID DENSITY, VISCOSITY, PERCENTAGE ENTRAINED GAS, ETC.).

- W. PLANNED ELECTRICAL INPUTS, OUTPUTS OR BOTH DURING TEST.
- X. BLOCK DIAGRAMS AND IDENTIFICATION OF MAKE AND MODEL OF MEASUREMENT AND ANALYSIS INSTRUMENTATION TO BE USED.
- Y. BLOCK DIAGRAMS AND IDENTIFICATION OF MAKE AND MODEL OF SYSTEM CALIBRATION INSTRUMENTATION TO BE USED (INCLUDING ACCELEROMETERS, MICROPHONES, AND HYDROPHONES).
- Z. PLACE AND DATE OF LATEST LABORATORY CALIBRATION OF MEASUREMENT INSTRUMENTS, SYSTEM CALIBRATION INSTRUMENTS (INCLUDING FIELD CALIBRATORS), AND ANALYSIS INSTRUMENTS WHICH WILL BE USED.
- AA. ACCELEROMETER MAKE AND MODEL, MOUNTING METHOD, AND LOCATION AND ORIENTATION DURING TESTING.
- BB. THE MAKE AND MODEL OF ANALYZER TO BE USED FOR TRANSIENT STRUCTUREBORNE NOISE TESTING.

DRAWINGS AND SKETCHES TO SHOW ASSEMBLY INFORMATION, EQUIPMENT DETAILS AND THE TEST SET UP.

- A. OVERALL UNIT DIMENSIONS AND ORIENTATION (VERTICAL, HORIZONTAL, ANGLE, ETC.) TO BE USED DURING TEST.
- B. IDENTIFICATION OF MAJOR COMPONENTS.
- C. INTERFACE INFORMATION.
- D. MOUNTING LOCATIONS AND DIMENSIONS.
- E. WEIGHTS (WET AND DRY) AND CENTER OF GRAVITY (WET AND DRY) FOR MAJOR COMPONENTS.
- F. RESILIENT MOUNT ORIENTATION (VERTICAL, HORIZONTAL, ANGLE), APPROXIMATE LOAD ON EACH MOUNT, ATTACHMENT LOCATIONS, OVERALL UNIT WEIGHT AND CENTER OF GRAVITY.
- G. BEDPLATE OR SUBBASE DIMENSIONS, MATERIALS AND WEIGHT, WHEN APPLICABLE.

- H. DIMENSIONS, MATERIALS AND WEIGHT OF THE MOUNTING FIXTURE IF A MOUNTING FIXTURE OTHER THAN THE STANDARD FIXTURE IS TO BE USED.
- I. PLANNED ARRANGEMENT AND DESCRIPTION OF FLEXIBLE PIPES AND DUCTS, IF TO BE USED.
- J. PLANNED ARRANGEMENT OF TEST PIPING AND FITTINGS.
- K. PLANNED ARRANGEMENT OF ELECTRICAL POWER LEADS.
- L. THE DETAILED DIMENSIONS, CAPACITIES, RELATIVE LOCATIONS, AND OTHER PERTINENT CHARACTERISTICS OF PIPES, SUMPS, TANKS, FLOW CONTROL DEVICES, FLOW METERS, VENTS, FILTERS, AND CHARGING AND COOLING SYSTEMS FOR LIQUIDBORNE TESTING, SUCTION PRESSURE, DEVELOPED HEAD, ENTRAINED GAS, TEMPERATURE, AND LIQUIDBORNE NOISE.
- M. PLANNED LOCATION AND DESCRIPTION OF TEST INSTRUMENTATION USED TO MEASURE RPM, FLOW RATES, TOTAL DISCHARGE HEAD, POWER, SUCTION PRESSURE, ENTRAINED GAS, TEMPERATURE LIQUIDBORNE NOISE.
- N. PLANNED LOCATIONS OF RESILIENT MOUNTS AND PEDESTALS OR FIXTURES THAT SUPPORT THE EQUIPMENT.
- O. APPROXIMATE LOCATIONS AND ORIENTATION OF EACH MICROPHONE RELATIVE TO EQUIPMENT FEATURES.
- P. THE EXACT LOCATION, MOUNTING DETAIL, MAKE AND MODEL OF THE HYDROPHONES TO BE USED FOR LIQUIDBORNE TESTING.
- Q. LOCATIONS OF EQUIPMENT AIR INLET AND DISCHARGE OPENINGS.
- R. DESCRIPTION OF ACOUSTICAL CENTER OF SOUND SOURCE, ASSUMED OR MEASURED.
- S. ACOUSTICAL ENVIRONMENT (INDOOR).

(1) DESCRIPTION OF PLANNED LOCATION AND

ORIENTATION OF TEST UNIT RELATIVE TO FLOOR, WALLS, CEILING, AND CONTENTS OF TEST ROOM.

- (2) DESCRIPTION OF PLANNED TEST LOCATION (ANECHOIC, REVERBERANT, ETC.), DIMENSIONS OF THE TEST ROOM OR CHAMBER DESCRIPTION OF THE PHYSICAL TREATMENT ON WALLS, CEILING AND FLOOR.

T. ACOUSTICAL ENVIRONMENT (OUTDOOR)

- (1) DESCRIPTION OF PLANNED LOCATION AND ORIENTATION OF TEST UNIT RELATIVE TO BUILDINGS, STRUCTURES OR OTHER REFLECTING SURFACES OR OBJECTS.
- (2) DESCRIPTION OF THE PLANNED GROUND SURFACE, AND WIND DIRECTION AND SPEED.

TEST DATA FORMATS.

- A. TABULAR OR GRAPHIC FORMATS TO BE USED IN TABULATING AND RECORDING AIRBORNE DATA.
- B. TABULAR AND GRAPHIC DATA FORMAT TO BE USED IN TABULATING AND RECORDING STRUCTUREBORNE, TRANSIENT STRUCTUREBORNE, AND LIQUIDBORNE VIBRATORY ACCELERATION DATA.

THE SELLER SHALL COMBINE THE TEST PROCEDURES FOR ALL THE REQUIRED ACOUSTIC TESTING OF A COMPONENT INTO A SINGLE EQUIPMENT NOISE EVALUATION TEST PLAN.

THE TITLE PAGE OF THE EQUIPMENT NOISE EVALUATION TEST PLAN WILL CLEARLY STATE THE TYPE(S) OF TESTING COVERED BY THE PLAN.

FOR EXAMPLE:

"EQUIPMENT NOISE EVALUATION TEST PLAN FOR AIRBORNE, STRUCTUREBORNE, AND LIQUIDBORNE NOISE TESTING OF AUXILLIARY DRAIN PUMP".

THE SELLER SHALL SEND A COPY OF ALL EQUIPMENT NOISE EVALUATION TEST PLANS WHICH COVER LIQUIDBORNE NOISE TESTING TO:

NAVAL SURFACE WARFARE CENTER  
CARDEROCK DIVISION  
ANNAPOLIS DETACHMENT  
CODE 841  
ANNAPOLIS, MD 21402-5067

FOR PURCHASE ORDERS THAT ORIGINATE FROM NEWPORT NEWS  
SHIPBUILDING, REFER TO STANDARD CLAUSE 38-4 FOR SUBMITTAL OF ALL  
UNAPPROVED PURCHASE ORDER SOFTWARE DELIVERABLES.